

submitted earlier in the prosecution of this case supporting this position. The Declaration states that the Applicants invented the present invention prior to the effective or filing date of the Mannava et al. '009 patent. The Declaration states that the Applicants conceived the present invention prior to the effective or filing date of the Mannava et al. '009 patent and was diligent in reducing it to practice up until the filing date of the present invention. Proof of diligence was submitted in the form of test data from tests performed during the time between conception and filing the present Application. Therefore, the Applicants respectfully submit that the Examiner's rejection of Claims 1-20 under 35 U.S.C. §103(a), as being unpatentable over Mannava et al. 5,591,009, in view of Neal et al. 4,426,867 and Mallozzi et al. 3,850,698, has been overcome by the remarks above and should be withdrawn.

Mannava et al. 5,591,009 teaches laser shock peening of a fan blade not a compressor blade as taught and claimed in the present Application. Thus, the Examiner's statement that "The Mannava 5,591,009 reference is a U.S. patent that claims the rejected invention." is clearly incorrect. The Applicants respectfully submit that the Examiner's conclusion that "An affidavit or declaration is inappropriate under 37 CFR 1.13 1(a)" when the patent is claiming the same patentable invention is not relevant because Mannava et al. 5,591,009 and the present invention clearly do not claim the same invention. The Examiner further stated "that the same patentable invention is defined in MPEP 715.05 as when the invention is considered obvious under 35 USC 103. The specification limitation in the instant application of the peening depth of 20 to 50 mils is considered obvious." is not conclusive because the Examiner failed to take into account the

differences of the leading edges between the fan blade taught by Mannava et al. 5,591,009 and the compressor blade taught and claimed in the present Application. Furthermore, the conclusion by the Examiner that "The specification limitation in the instant application of the peening depth of 20 to 50 mils is considered obvious." is totally without support in the prior art. This is particularly important, in light of the Neal et al. patent, because the stresses are deep stresses produced by and far stronger forces are used than taught by Neal et al. The Neal et al. patent deals specifically with compressor blades which are denoted as having thin leading edges and Neal et al. warns against strong forces of direct shot peening fearing damage to the blade edges caused by severe impact of shot on the surface to be peened (column 1, lines 33-65), thus, teaching away from the present invention and from Mannava et al. 5,591,009.

The depth limitation of the compressive residual stresses of the present invention more clearly defines and points out the nature of the compressive residual stresses imparted by the laser shock peening process and points out that they are deep stresses and far stronger forces are used than taught by Neal et al. Neal et al. warns against strong forces fearing damage to the blade edges caused by severe impact of shot on the surface to be peened (column 1, lines 33-65), thus, teaching away from the present invention.

Laser shock peening is an explosive process, as understood in the art and as used herein, and the prior art has not shown laser shock peening to be interchangeable with or the equivalent of shot peening. Laser shock peening uses a laser beam to produce a strong localized compressive force on a portion of a surface. The laser beam is fired through a curtain of flowing water that is flowed over a painted surface

and the paint is ablated generating plasma which results in shock waves on the surface of the material. These shock waves produce forces that act normal to the surface of edges of the airfoil and, therefore, directly away from the teaching of Neal et al. which desires the impact of the shot, due to gravity shot peening, to be at a maximum oblique angle to the tangent of the edge surface which is designed to lessen the peening force to avoid deformation.

Neal et al. clearly teaches directly away from both the '009 patent reference and the teaching of the present invention. Neal et al. clearly teaches and warns away from using a direct force normal to the surface being peened as is done in the present invention and the '009 patent.

The Examiner stated that it would have been obvious to a person of ordinary skill in the art to utilize the repaired laser shock peened gas turbine engine component in Mannava et al. '009 for the compressor blades as taught by Neal et al. The argument above clearly shows this is not the case, particularly, in light of the differences in thickness of leading edges of fan blades such as disclosed in the '009 patent and those of the compressor blades of both Neal et al. and the present Application. The Examiner fails to take into account that Neal et al. expressly states that normal shot peening damages the leading edge surface and that Neal et al. teaches to lessen the blow by directing the shot at an oblique angle to a tangent of the surface. This teaching of Neal et al., when taken with the rest of the whole of the prior art, clearly teaches one not to use the teaching in the Mannava et al. '009 reference to peen an edge of a compressor airfoil.

Furthermore, because of the angling of the blade in Neal et al. to avoid a normal hit on the surface, it would be impossible to have simultaneously peened pressure and suction

sides of the edges of the blade as is claimed in Claims 3, 5, 8, 9, 13, 14, 18 and 19.

Therefore, the Applicants respectfully submit that it would not have been further obvious at the time the invention was made to a person having ordinary skill in the art to apply the laser shock peening as taught in the Mannava et al. 5,591,009 patent to the blade of Neal et al.

The Applicants respectfully submit that the Examiner's combination of prior art and subsequent rejection have been overcome by the remarks above and that the present Claims 1-20 are patentable over the combination of cited references because of the differences between the prior art and the Claims at issue. The prior art itself not only fails to teach a particular combination which results in the claimed invention, but in fact, teaches away from and warns against the present invention and is inconsistent with the purposes of the present invention.

Therefore, the Applicants respectfully submit that the Examiner's rejection of amended Claims 1-20 under 35 U.S.C. 103(a), has been overcome by the remarks above, because of the absence of features of the presently claimed invention, because there has been nothing, not even a suggestion, shown in the prior art as to why the references should be combined as done by the Examiner and because it appears that the Neal et al. reference teaches away from both the present invention and the Mannava et al. '009 reference.

Double Patenting

2. The Applicants have now studied the Examiner's obvious type Double Patenting rejections of Claims 1-20 under the judicially created doctrine of double patenting. Claims 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 16, 17, and 18 stand rejected,

under the judicially created doctrine of double patenting, over Claims 1, 1, 3, 1, 3, 1, 1, 3, 1, 1, 3, 1, 1, and 3, respectively, of U.S. Patent No. 5,591,009, in view of Neal et al. and Mallozzi et al. Claims 9-10, 14-15, and 19-20 stand rejected, under the judicially created doctrine of double patenting, over Claims 4, 4, 4, 4, 4, and 4, respectively, of U.S. Patent No. 5,591,009 in view of Neal et al.

The Applicants respectfully disagree with the Examiner for the reasons stated below. The Examiner states that Claims 1 and 9 of Mannava et al. '009 claim substantially the same subject matter as the present Application except for the gas turbine component being a compressor blade. This is not correct because the Claims in '009 all specifically claim a fan blade which is substantially different than a compressor blade. Fan blades are far bigger and thicker than compressor blades. A well known concern for the thinness of compressor blades is expressed in Neal et al. (col. 1, lines 44-57). The Examiner states that Neal et al. teaches compressor may be peened but that is not fully correct and is taken out of context. Neal et al. teaches they can be peened at oblique angles avoiding normal hits along the edge and warns against normal hits along the edge.

Each of Claims 1-20 also stand rejected, under the judicially created doctrine of double patenting, over Claim 1 of U.S. Patent No. 5,531,570. The Applicants respectfully submit that the judicially created doctrine of double patenting type rejection over Claim 1 of U.S. Patent No. 5,531,570 has been overcome by the Terminal Disclaimer enclosed herein.

The Applicants respectfully submit that the Examiner's obvious type Double Patenting rejections of Claims 1-20 with regards to U.S. Patent Nos. 5,591,009 and 5,531,570 have been

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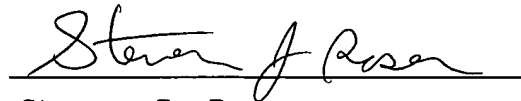
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overcome by the remarks above.

3. The Applicants respectfully submit that Claims 1-20 are now in condition for allowance based on the amendments and remarks above.

Respectfully submitted,

A handwritten signature in cursive script, reading "Steven J. Rosen", is written over a horizontal line.

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